

EXPERT'S DECLARATION UNDER 37 CFR 1.132

I, ORITA Masahiro, declare the following to be true:

1.

I consider myself to be an expert in the field of Semiconductor Material Design followed by Degree of Dr. of Science (PhD), granted by Tokyo Institute of Technology on 24/March/1987.

Relevant experience listing:

Corporation: HOYA Corporation, R&D Center, LET Project Reader,
April/2002 ~ December/2006

Laboratory: Japan Science and Technology Agency,
Hosono ERATO Project, Group Leader,
July/1999~March/2002

University: Tokyo Institute of Technology, Science Division,
Post Graduate Student, PhD Course, March/1987

1-1.

Employee of HOYA Corporation

2.

Conditions for interfaces between electrodes and semiconductors without any energy barrier were explained in the paragraph which starts on line 25 of page 23 of the filed US patent application 10/554,136. That is, in general, work function

of the electrode which emits electrons (it is referred to as n-electrode in this specification) must be lower than conduction band edge energy, and at the same time, work function of the electrode which emits holes (it is referred to as p-electrode in this specification) must be higher than valence band edge energy. An interface without any energy barrier is also called an ohmic contact. The energy arrangement condition for barrier free interface is widely known by the experts of this technology field as described by Sheng S. Li in the textbook *Semiconductor Physical Electronics*, (Plenum, 1993), pp. 252-256.

However, on the line 1 of the page 24 of the specification, it is written that work function of the p-electrode higher than the conduction band edge energy gives barrier free combination of electrode and semiconductor. It is obvious that this proposition is clearly wrong, because it conflicts to the band arrangement described above. The contradiction comes from the typographical error on the line 1 of page 24, where the term of "conduction band" is written instead of "valence band". It must be natural for the experts of this field understand that the discrepancy does not come from mistake of technological understanding but comes from simple writing error. I believe that one of ordinary skill in the field understands that "conduction band" at lines 1-2, page 24 should be corrected to "valence band."

Application/Control Number: 10/554,135
Attorney Docket: 3836.001
October 12, 2010
3/5

I hereby declare that all statement made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

ORITA, Masahiro

Orita, Masahiro

Application/Control Number: 10/554,135
Attorney Docket: 3836.001
October 12, 2010
4/5

I, OHTA Hiromichi, declare to following to be true:

3.

I consider myself to be an expert in the field of Semiconducting Materials and Devices followed by Degree of Dr. of Engineering (PhD), granted by Tokyo Institute of Technology on October/2001.

Relevant experience listing:

Corporation: SANYO Electric Co. Ltd. April/1996 ~ December/1997

HOYA Corporation, R&D Center

January/1998 ~ September/2003

Laboratory: Japan Science and Technology Agency,

Hosono ERATO Project

November/1999 ~ September/2004

Japan Science and Technology Agency, PRESTO

October/2008 ~ Present

University: Tokyo Institute of Technology, PhD Course,

October/2001

Nagoya University, Graduate School of Engineering,

Associate Professor, October/2003 ~ Present

4.

As Dr. Orita described above, in this invention, the work function of p-electrode must be larger than the energy of the valence band top. The original description on page 24 line 1 is obviously wrong. Thus, I judge Dr. Orita's argument is correct.

I hereby declare that all statement made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and

Application/Control Number: 10/554,135
Attorney Docket: 3836.001
October 12, 2010
5/5

further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application and any patent issued thereon.

OHTA, Hiromichi

Ohta, Hiromichi

Associate Professor,

Graduate School of Engineering,

Nagoya University